HAWAII AGRICULTURAL EXPERIMENT STATION
Honolulu, Hawaii
Under the joint supervision of the
UNIVERSITY OF HAWAII
and the
UNITED STATES DEPARTMENT OF AGRICULTURE

CIRCULAR NO. 12

The Relationship of Artificial Illumination to Pullet Raising in Hawaii

With Special Reference to Partial Molt and Egg Production

BY

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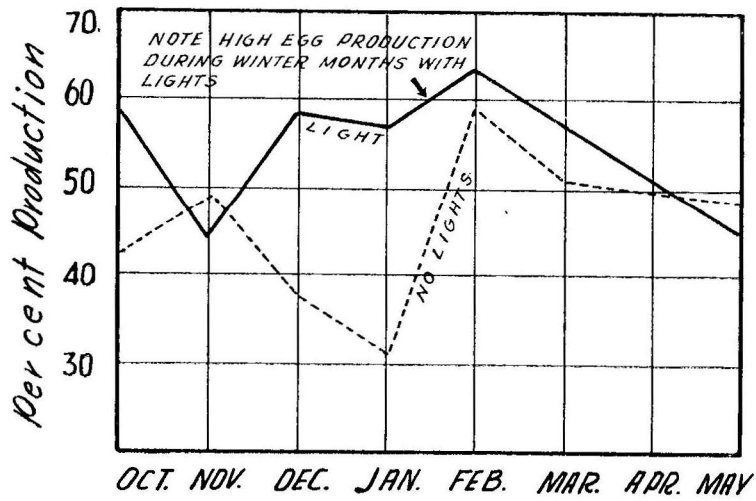

Artificial Illumination increases fall and winter Egg Production

Published 1937 by University of Hawaii, Honolulu

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Introduction

In mainland poultry houses, the use of artificial illumination as a supplement to natural daylight during the winter months has proved practical and profitable. Thus prolonging the light hours per day has stimulated egg laying. Field observations have indicated that egg production is increased to as much as 50 to 70 per cent more than is normal without artificial illumination, but a decided decrease in spring production results.

On the mainland, where a greater difference exists between daylight hours and darkness than in Hawaii, artificial illumination has proved to be of economic importance to commercial poultrymen. It is of interest to know whether the flocks in Hawaii will react in a similar way.

Value of Artificial Illumination

Pullets hatched during November, December, January, and February have a tendency to go into a partial molt before a full year of lay. Egg production during this partial molt period is considerably lowered, in some cases not exceeding 35 per cent of normal production, and this occurs at the time when market prices of eggs are at their peak.

Type and Use of Lights

Kerosene lanterns, gasoline lanterns, or electric lights are in general use by poultrymen to supply artificial illumination. Electric lights are safest, and they lend themselves to automatic control by time clocks, thus requiring little attention from the poultryman. Where the morning light system is used, no unusual equipment or wiring is necessary.

However, when both morning and evening lights are used, a dimming device is required to reduce the light at night gradually, so the birds will seek their way to the roosts. In Hawaii, the morning system, in which the lights are turned on at 4 a. m., seems to work in well with the management on most commercial farms.

A satisfactory lighting unit consists of one 60-watt lamp with a cone-shaped reflector 16 inches in diameter and 4 inches in depth. This reflector is made of sheet metal, and is coated on the interior with aluminium bronze and French bronzing liquid. One ounce of aluminium bronze mixed with one pint of French bronzing liquid is sufficient for three coatings on ten reflectors.

The reflectors should be placed 6 feet above the floor along a line midway between the front of the house and the front edge of the dropping board or roosting section. This arrangement makes it possible to light the feed hoppers, water troughs and nests. A 40- or 60-watt globe is satisfactory to light 150 square feet of floor space. The exact amount of light to use depends upon the type of house and upon the arrangement of the interior fixtures.

Thirteen to fourteen light hours per day are recommended as sufficient to increase egg production and to control partial molt during the fall months.

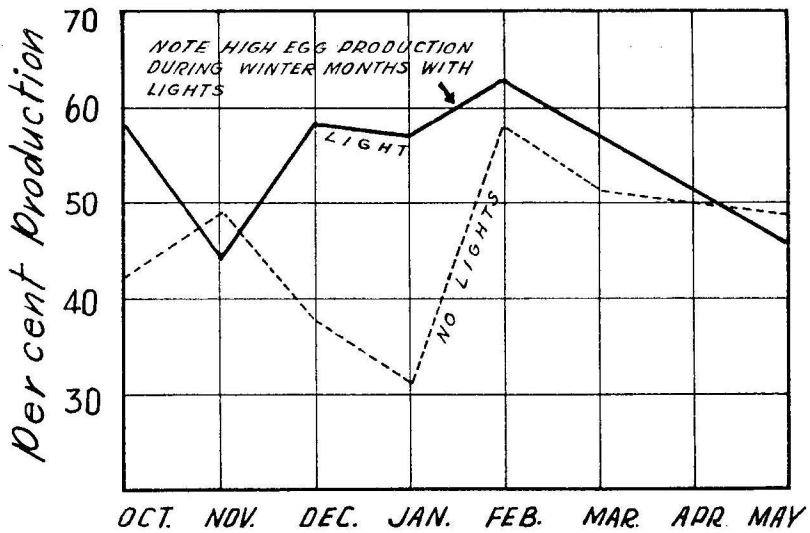

FIG. 1
Per Cent Egg Production (Five-Year Average) Based on the Original Number of Birds

A series of experiments has been conducted at the Hawaii Agricultural Experiment Station over a period of five years to study the value of artificial illumination on laying pullets. Results show that its use effected a decided increase in egg production during December, January, and February, when egg prices are at their peak, thus increasing the earning power of the hen. Production, based on the original number of pullets in the experimental pen on October 1, increased to more than 60 per cent, as shown in Figure 1.

In Figure 1, the average of the actual number of eggs produced during the five-year period is converted into percentage of perfect production. For instance, when the production line crosses the percentage line at 60, the meaning is that at that time the number of eggs laid was 60 per cent of what it would have been had every hen laid one egg every day. With this increased production, the birds maintained normal body weight and standard egg size, as indicated in Table I.

Table I. WEIGHT OF EGGS AND AVERAGE BODY WEIGHT OF BIRDS

LOT NO.	ILLUMINATION	AVERAGE WEIGHT OF EGGS	AVERAGE WEIGHTS OF BIRDS		
		OUNCES PER DOZEN	INITIAL	FINAL	DIFFERENCE
1	Artificial supplement	22.6	3.2 lb	3.7 lb	+ .5 lb
2	Artificial supplement	21.7	4.4	5.2	+ .8
3	Artificial supplement	22.5	3.0	3.7	+ .7
4	Natural only . . .	22.0	4.1	4.7	+ .6
5	Natural only . . .	22.3	3.2	3.7	+ .5

Lighting did not have a detrimental effect on the physical condition of the birds; the mortality was no greater than in groups of birds in which no lights were used.

When birds lose weight because of high egg production and inadequate feed consumption, a rest period or pause in egg production occurs. During this rest period the birds go through a partial molt, shedding feathers from the head, neck and, in some instances, the body. The use of lights to prolong the day enables the bird to consume more feed, which results in the maintenance of normal body weight and the consequent control of partial molt. Figure 2 shows the relationship of artificial illumination to partial molt and to the average number of days in the molting period.

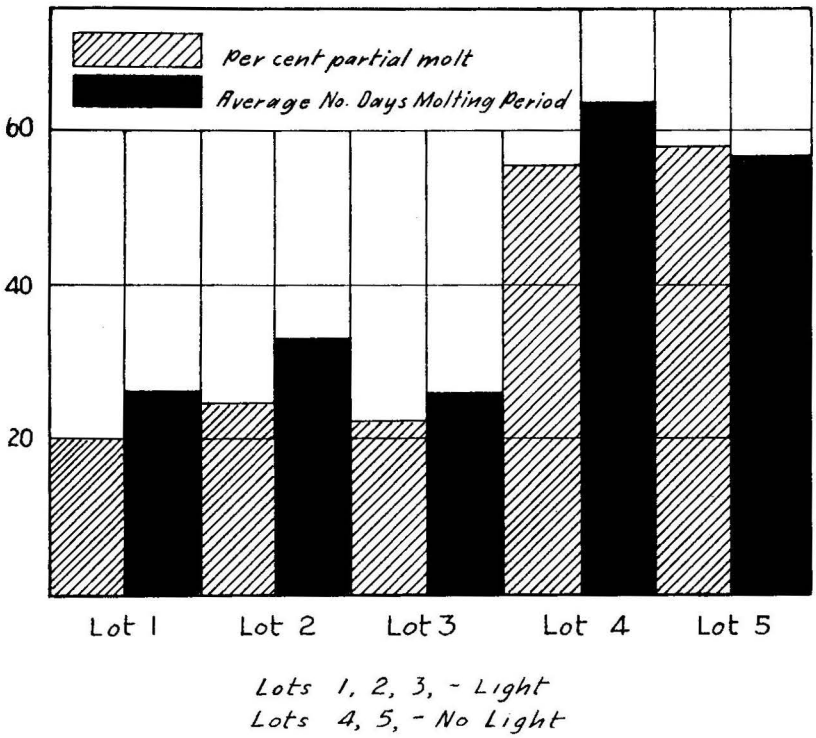

FIG. 2
Relationship of Artificial Illumination to Partial Molt

Lots 4 and 5, without lights, were in molt about 20 days longer than lots 1, 2, and 3, which had artificial lights.

In order to keep the number of light hours to at least thirteen, the lights should be put into operation beginning October 1, for continuous use throughout the shorter days of the year. The lights should at first be turned on at 5 a. m., and the lighting hour made fifteen minutes earlier each subsequent week until they are coming on at 4 a. m., at which hour they remain until March 1. Beginning March 1, the artificial illumination period should be decreased fifteen minutes each week until the length of day is again thirteen daylight hours, at which time the lights can be discontinued until the following fall.

FEEDING METHODS, CONSUMPTION AND COSTS

Prolongation of the normal day would be futile if the poultryman were to neglect to have feed and water available during the supple-

mented hours of artificial light. The mash hoppers and water troughs should be so placed that they are brightly illuminated. Regardless of the type of feed used, its availability to the birds is of primary importance. In these tests at the Hawaii Agricultural Experiment Station during 1932-37 the cost averaged $0.20 per bird per month for feed, at an average feed consumption of eight pounds per pullet for each month. This was slightly higher than that of birds receiving no light. It cost approximately $0.14 to produce a dozen of eggs when lights were used, as compared to $0.17 without lights.

Considering the many advantages of lighting, when properly used, it seems an efficient and economical means of increasing the yearly earning power of pullets in their first year of lay.

Summary

Artificial illumination during the fall and winter months lengthens the day for pullets and increases egg production.

Pullets under artificial illumination maintain normal body weight and egg size.

The average mortality is not increased by the use of lights.

A thirteen hour day is sufficient to maintain normal body weight and high egg production, and to control partial molt.

During the period 1932-37, the use of lights reduced the cost of feed to produce one dozen eggs about 3 cents. The cost of electricity per dozen eggs produced was ½ cent.